



**UNITED STATES  
NUCLEAR REGULATORY COMMISSION**

REGION III  
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March 31, 2015

Mr. Paul Fessler  
Chief Nuclear Officer  
DTE Energy Company  
Fermi 2 - 210 NOC  
6400 North Dixie Highway  
Newport, MI 48166

**SUBJECT: FERMI POWER PLANT, UNIT 2, EVALUATIONS OF CHANGES, TESTS, AND  
EXPERIMENTS AND PERMANENT PLANT MODIFICATIONS BASELINE  
INSPECTION REPORT 05000341/2015008**

Dear Mr. Fessler:

On March 9, 2015, the U.S. Nuclear Regulatory Commission (NRC) completed an Evaluations of Changes, Tests, and Experiments, and Permanent Plant Modifications inspection at your Fermi Power Plant, Unit 2. The enclosed inspection report documents the inspection results, which were discussed on March 9, 2015, with Ms. K. Hullum-Lawson, and on February 13, 2015, with Mr. W. Colonnello, and other members of your staff.

The inspection examined activities conducted under your license as they relate to safety and compliance with the Commission's rules and regulations, and with the conditions of your license. The inspectors reviewed selected procedures and records, observed activities, and interviewed personnel.

Three NRC-identified findings of very-low safety significance (Green) were identified during this inspection. These findings were determined to involve violations of NRC requirements. However, because of their very-low safety significance, and because the issues were entered into your Corrective Action Program, the NRC is treating the issues as Non-Cited Violations (NCVs) in accordance with Section 2.3.2 of the NRC Enforcement Policy.

If you contest the subject or severity of the NCVs, you should provide a response within 30 days of the date of this inspection report, with the basis for your denial, to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, DC 20555-0001, with copies to the Regional Administrator, Region III; the Director, Office of Enforcement, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001; and the NRC Resident Inspector at Fermi Power Plant. In addition, if you disagree with the cross-cutting aspect assigned to any finding in this report, you should provide a response within 30 days of the date of this inspection report, with the basis for your disagreement, to the Regional Administrator, Region III, and the NRC Resident Inspector at Fermi Power Plant.

P. Fessler

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In accordance with Title 10 of the *Code of Federal Regulations* (10 CFR) 2.390, "Public Inspections, Exemptions, Requests for Withholding," of the NRC's "Rules of Practice," a copy of this letter, its enclosure, and your response (if any) will be available electronically for public inspection in the NRC's Public Document Room or from the Publicly Available Records (PARS) component of the NRC's Agencywide Documents Access and Management System (ADAMS). ADAMS is accessible from the NRC Web site at <http://www.nrc.gov/reading-rm/adams.html> (the Public Electronic Reading Room).

Sincerely,

**/RA/**

Robert C. Daley, Chief  
Engineering Branch 3  
Division of Reactor Safety

Docket No. 50-341  
License No. NPF-43

Enclosure:  
Inspection Report 05000341/2015008  
w/Attachment: Supplemental Information

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U. S. NUCLEAR REGULATORY COMMISSION

REGION III

Docket No: 50-341

License No: NPF-43

Report No: 05000341/2015008

Licensee: DTE Electric Company

Facility: Fermi Power Plant, Unit 2

Location: Newport, MI

Dates: January 26, 2015 – March 9, 2015

Inspectors: A. Dahbur, Senior Reactor Inspector (Lead)  
A. Shaikh, Reactor Inspector  
J. Corujo-Sandin, Reactor Inspector

Approved by: Robert C. Daley, Chief  
Engineering Branch 3  
Division of Reactor Safety

Enclosure

## SUMMARY OF FINDINGS

Inspection Report 05000341/2015008; 01/26/2015 - 03/09/2015; Fermi Power Plant, Unit 2; Evaluations of Changes, Tests, and Experiments and Permanent Plant Modifications.

This report covers a two-week announced baseline inspection on evaluations of changes, tests, and experiments, and permanent plant modifications. The inspection was conducted by Region III based engineering inspectors. Three findings of very-low safety significance were identified by the inspectors. Each finding was considered a Non-Cited Violation (NCV) of U.S. Nuclear Regulatory Commission (NRC) regulations. The significance of most findings is indicated by their color (i.e., greater than Green, or Green, White, Yellow, Red) using Inspection Manual Chapter (IMC) 0609, "Significance Determination Process (SDP)". Cross-cutting aspects were determined using IMC 0310, "Aspects within the Cross-Cutting Areas." Findings for which the SDP does not apply may be Green, or be assigned a severity level after NRC management review. All violations of NRC requirements are dispositioned in accordance with the NRC's Enforcement Policy, dated July 9, 2013. The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG-1649, "Reactor Oversight Process," Revision 5, dated February 2014.

### **NRC-Identified and Self-Revealed Findings**

#### **Cornerstones: Initiating Events, Mitigation Systems, and Barrier Integrity**

- **Green.** The inspectors identified a finding of very-low safety significance (Green), and an associated NCV of Title 10, *Code of Federal Regulations* (CFR) Part 50, Appendix B, Criterion III, "Design Control," for the licensee's failure to ensure instructions in plant procedures met the requirements as specified in the Technical Specifications (TSs). Specifically, the licensee failed to ensure that the caution statements as specified in the system operating procedures regarding the operability of the control center chillers when their associated Emergency Equipment Cooling Water Temperature Control Valve (TCV) was not in AUTO incorporated all the applicability modes for TS 3.7.4. The licensee entered this finding into their Corrective Action Program (CAP) as CARD 15-20790, and intended to revise the affected procedures to accurately translate TS 3.7.4 mode and plant conditions applicability requirements.

The performance deficiency was determined to be more than minor because, if left uncorrected, it would have the potential to lead to a more significant safety concern. Specifically, the licensee could potentially consider the control center heating, ventilation, air conditioning system operable during movement of recently irradiated fuel assemblies and operations with potential for draining reactor vessel conditions while the TCV was not in the Updated Final Safety Analysis Report described AUTO design function and, therefore, challenged the control center habitability. The finding screened as of very-low safety significance (Green) because the finding did not represent a degradation of the radiological barrier function, or represent a degradation of the control room barrier function against smoke or toxic atmosphere. The inspectors did not identify a cross-cutting aspect associated with this finding. (Section 1R17.1.b.(1))

- **Green.** The inspectors identified a finding of very-low safety significance (Green), and an associated NCV of TS 5.4.1.a, "Procedures," for the licensee's failure to have adequate procedural guidance when performing Temporary Change Notices (TCNs). Specifically, Procedure MGA04, "TCNs," Revision 18 allowed plant personnel 14 days to perform a 10 CFR 50.59 applicability review after the TCN had been approved or/and

implemented. The licensee entered this finding into their CAP as CARD 15-20935, and issued a memo to all site personnel discussing the inaccurate statement in MGA04, and started the process to revise Manual MGA04.

The performance deficiency was determined to be more than minor because, if left uncorrected, it would have the potential to lead to a more significant safety concern. Specifically, temporary changes to operating procedures could be implemented prior to ensuring the changes to the facility would screen out of the 50.59 process, and it would not impact safety. The finding screened as of very-low safety significance (Green) because the inspectors answered “No,” to all questions under Appendix A, exhibits of IMC 0609. The inspectors did not identify a cross-cutting aspect associated with this finding because the finding was not representative of the licensee’s current performance. (Section 1R17.1.b.(2))

- Green. The inspectors identified a finding of very-low safety significance (Green), and an associated NCV of 10 CFR Part 50, Appendix B, Criterion III, “Design Control,” for the licensee’s failure to ensure that design parameters for Structures, Systems, and Components (SSCs) installed in the plant were bounded by the design calculations. Specifically, the licensee failed to verify by testing that the turn ratio, and the impedance for the control power transformers (CPTs) used to supply control power to several SSCs installed in the plant were less than or equal to the values used in the degraded voltage calculations. The licensee entered this finding into their CAP as CARD 15-21129, and determined that there was reasonable assurance that the CPTs installed in the field are capable of performing their design function.

The performance deficiency was determined to be more than minor because the finding was associated with the Mitigating Systems cornerstone attribute of design control and affected the cornerstone objective of ensuring the capability and reliability of systems that respond to initiating events. The finding screened as of very-low safety significance (Green) because the finding did not result in the loss of operability or functionality of any affected SSCs. The inspectors determined this finding had an associated cross-cutting aspect, Conservative Bias, in the Human Performance cross-cutting area because of the licensee failure to use decision making practices that emphasize prudent choices over those that were simply allowable. [H.14] (Section 1R17.2.b.(1))

### **Licensee-Identified Violations**

No violations were identified.

## REPORT DETAILS

### 1. REACTOR SAFETY

#### **Cornerstones: Initiating Events, Mitigating Systems, and Barrier Integrity**

#### 1R17 Evaluations of Changes, Tests, and Experiments and Permanent Plant Modifications (71111.17T)

##### .1 Evaluation of Changes, Tests, and Experiments

##### a. Inspection Scope

The inspectors reviewed 7 safety evaluations performed pursuant to Title 10, *Code of Federal Regulations* (CFR) 50.59 to determine if the evaluations were adequate and that prior U.S. Nuclear Regulatory Commission (NRC) approval was obtained as appropriate. The inspectors also reviewed 23 screenings and/or applicability determinations where licensee personnel had determined that a 10 CFR 50.59 evaluation was not necessary. The inspectors reviewed these documents to determine if:

- the changes, tests, and experiments performed were evaluated in accordance with 10 CFR 50.59, and that sufficient documentation existed to confirm that a license amendment was not required;
- the safety issue requiring the change, tests or experiment was resolved;
- the licensee conclusions for evaluations of changes, tests, and experiments were correct and consistent with 10 CFR 50.59; and
- the design and licensing basis documentation was updated to reflect the change.

The inspectors used, in part, Nuclear Energy Institute (NEI) 96-07, "Guidelines for 10 CFR 50.59 Implementation," Revision 1, to determine acceptability of the completed evaluations, and screenings. The NEI document was endorsed by the NRC in Regulatory Guide 1.187, "Guidance for Implementation of 10 CFR 50.59, Changes, Tests, and Experiments," dated November 2000. The inspectors also consulted Part 9900 of the NRC Inspection Manual, "10 CFR Guidance for 10 CFR 50.59, Changes, Tests, and Experiments."

This inspection constituted 7 samples of evaluations, and 23 samples of screenings and/or applicability determinations as defined in Inspection Procedure (IP) 71111.17-04.

##### b. Findings

##### (1) Failure to Translate Technical Specification 3.7.4 Requirements Correctly into Plant Procedures

Introduction: The inspectors identified a finding of very-low safety significance (Green), and an associated NCV of 10 CFR Part 50, Appendix B, Criterion III, "Design Control," for the licensee's failure to ensure instructions in plant procedures met the requirements as specified in the Technical Specifications (TSs). Specifically, the licensee failed to ensure that the caution statements as specified in the system operating procedures regarding the operability of the control center chillers when their associated Emergency Equipment Cooling Water (EECW), Temperature Control Valve (TCV) was not in AUTO, incorporated all the applicability modes and plant conditions for TS 3.7.4.

Description: The Updated Final Safety Analysis Report (UFSAR), Section 9.2.2.1, states that the EESW supplies the cooling water for the closed loop EECW system. Heat load from the plant that is taken in by EECW is rejected to EESW, which in turn rejects the heat to the Ultimate Heat Sink (UHS). The UHS eventually rejects heat to the environment. During an accident, EESW flow is automatically controlled by throttling the TCV in order to maintain EECW supply temperature within the desired range (70-85 degrees Fahrenheit). This desired temperature range of 70-85 degrees Fahrenheit for the EECW maintains operability of the control center heating, ventilation, air conditioning (CCHVAC). The TS 3.7.4 requires that CCHVAC be operable for Modes 1, 2, and 3, during movement of recently irradiated fuel assemblies in secondary containment, and during operations with a potential for draining the reactor vessel (OPDRVs) conditions. During the review of screen 12-0073 associated with Temporary Change Notices (TCNs) 12246, 12247, and 12248 for the manual operation of TCV in lieu of automatic operation, the inspectors identified 5 inadequate operating procedures that had been revised in September 2012 under CARD 12-22221. These operating procedure revisions, 23.127, Revision 127, 23.208, Revision 105, 23.413, Revision 89, 1D88, Revision 18, and 2D14, Revision 17 stated that the CCHVAC be declared inoperable if the TCV is not in AUTO during Modes 1, 2, and 3 only. This statement contained in these procedures was misleading in that it does not identify that operability of the CCHVAC is applicable during movement of recently irradiated fuel assemblies in secondary containment and during (OPDRVs) as required by TS 3.7.4. Specifically, the procedures would allow the unrestricted operation of the CCHVAC during movement of recently irradiated fuel assemblies, and OPDVRs while the TCV is not in its UFSAR described AUTO design function. The licensee entered this issue into its Corrective Action Program (CAP) as CARD 15-20790 and intended to revise the affected procedures to accurately translate TS 3.7.4 mode applicability requirements. The revised procedures would consider the CCHVAC inoperable if the TCV was not in the AUTO function during Modes 1, 2, and 3, movement of recently irradiated fuel assemblies, and OPDVRs conditions.

Analysis: The inspectors determined the failure to ensure that the TS applicability mode requirements translated correctly into plant operating procedures was contrary to 10 CFR Part 50, Appendix B, Criterion III, "Design Control," and was a performance deficiency. Specifically, the licensee failed to ensure that the caution statement in the operating procedure to declare the CCHVAC chiller inoperable included all the applicable modes and plant conditions as specified in the TS. The current operating procedures did not require declaring the CCHVAC chiller inoperable when the associated EECW TCV was not in AUTO during movement of recently irradiated fuel assemblies, or during OPDRVs conditions. The TS 3.7.4 required 2 CCHVAC subsystems shall be operable in modes 1, 2, and 3, during movement of recently irradiated fuel assemblies, and during OPDRVs conditions.

The performance deficiency was determined to be more than minor, and a finding, because, if left uncorrected, the performance deficiency would have the potential to lead a more significant safety concern. Because the current plant operating procedures required declaring the CCHVAC chillers inoperable while the EECW TCV is not in AUTO only during Modes 1, 2 or 3, the licensee would have potentially used these plant operating procedures to consider the CCHVAC system operable during movement of recently irradiated fuel assemblies, and OPDVRs conditions while the TCV was not in the UFSAR described AUTO design function and, therefore, challenged the control center habitability.

In accordance with IMC 0609, "Significance Determination Process (SDP)," IMC 0609.04 Attachment, "Initial Characterization of Findings," Table 2, the inspectors determined the finding affected the Barrier Integrity cornerstone. As a result, the inspectors determined the finding could be evaluated using Appendix A, "The SDP for Findings At-Power," Exhibit 3 for the Barrier Integrity cornerstone screening questions. The inspectors answered "No" to both questions in Section C because the finding did not represent a degradation of the radiological barrier function or represent a degradation of the control room barrier function against smoke or toxic atmosphere.

In accordance with IMC 0310, "Aspects Within the Cross-Cutting Areas," the inspectors were unable to identify a primary or contributing cause for this finding; therefore, no cross-cutting aspects was associated with it.

Enforcement: Title 10 CFR Part 50, Appendix B, Criterion III, "Design Control," requires, in part, that measures shall be established to assure that applicable regulatory requirements and the design basis are correctly translated into specifications, drawings, procedures, and instructions. These measures shall include provisions to assure appropriate quality standards are specified and deviations from such standards are controlled.

Contrary to the above, as of September 7, 2012, the licensee failed to assure that TS 3.7.4 mode applicability requirements had been correctly translated into plant procedures. Specifically, the licensee failed to ensure that plant operating procedures 23.127, Revision 127, 23.208, Revision 105, 23.413, Revision 89, 1D88, Revision, and 2D14, Revision 17 included all TS 3.7.4 CCHVAC modes and plant conditions applicability. The operating procedures did not require the CCHVAC to be inoperable when the EECW TCV valve was not in AUTO during movement of recently irradiated fuel assemblies, and OPDVRs conditions. Because this violation was of very-low safety significance and it was entered into the licensee's CAP as CARD 15-20790, this violation is being treated as a Non-Cited Violation (NCV), consistent with Section 2.3.2 of the NRC Enforcement Policy. (NCV 05000341/2015008-01, "Failure to Translate TS 3.7.4 Requirements Correctly into Plant Procedures")

(2) Temporary Change Notice Administrative Conduct Manual MGA04 Deficiency

Introduction: The inspectors identified a finding of very-low safety significance (Green), and an associated NCV of TS 5.4.1.a, "Procedures," for the licensee's failure to have adequate procedural guidance when performing TCN. Specifically, procedure MGA04, "TCN," Revision 18 allowed plant personnel 14 days to perform a 10 CFR 50.59 applicability review after the TCN had been approved and/or implemented.

Description: During review of 10 CFR 50.59 Screening 12-0046, the inspectors noticed there was insufficient information to determine if the change had an adverse effect on the facility. The screening was prepared in support of TCN 12235 to revise operation procedure 23.104, "Condensate Storage and Transfer System," to change the vent point so scaffolding would not be needed. The inspectors discussed the screening with licensee personnel, and questioned the adequacy and the lack of details provided in the screening. As a result, the licensee entered the inspector concern into the CAP as CARD 15-20804, "Incomplete Description of UFSAR Design Function in 50.59 Screening," and documented the screening deficiencies. During subsequent discussion with the licensee, the inspectors did not identify any concern related to the activities and

changes as described in the TCN 12235. However, as a result of the extent of condition for CARD 15-20804, and the inspectors' questions related to the quality of the screenings prepared to support changes per the TCN process, it was determined that the screening did not meet the guidance described in Conduct Manual MGA04, "TCNs." The Conduct Manual MGA04 described the process for preparing, approving, distributing and using TCNs written against plant procedures. In addition, the licensee identified that Section 4.2.3 of MGA04 allowed plant personnel 14 days, after SRO approval of the TCN, to perform a 10 CFR 50.59 applicability determination/screening. The inspectors were concerned that the deficiency in the procedure could allow TCNs to be implemented prior to determining if the changes have an adverse effect on the facility, and could require NRC prior approval. The licensee documented this deficiency under CARD 15-20935, "TCN Procedure MGA04 Deficiency." As part of immediate corrective actions, the licensee issued a memo to all site personnel discussing the inaccurate statement in MGA04, and started the process to revise Conduct Manual MGA04.

The licensee determined the error was introduced when Revision 6 to MGA04 was issued on February 9, 1998. The current revision of MGA04, Revision 18, was issued on August 26, 2010. A preliminary review by the licensee identified two examples where the applicability determination/screening were performed after the TCN was approved. In both of these examples, problems with these changes were previously identified and entered into the CAP as CARD 10-24087, and CARD 12-21684. The actions for these CARDS were completed and closed.

Analysis: The inspectors determined that the licensee's failure to have adequate procedural guidance for performing TCNs was contrary to TS 5.4.1.a, and a performance deficiency. Specifically, TCN Administrative Conduct Manual MGA04 failed to ensure that a 10 CFR 50.59 applicability review was performed prior to the approval or the implantation of changes to operating procedures described in the UFSAR as specified NEI guidance 96-07, Revision 1.

The performance deficiency was determined to be more than minor, and a finding, because, if left uncorrected it could have the potential to lead to a more significant safety concern. Specifically, temporary changes to operating procedures could be implemented prior to ensuring the changes to the facility would not impact safety and screen out of the 50.59 process. In addition, two examples were identified where TCNs were inappropriately implemented without the complete review or necessary documentation.

In accordance with IMC 0609, "SDP," IMC 0609.04 Attachment, "Initial Characterization of Findings," Table 2, the inspectors determined the finding affected multiple cornerstones. As a result, the inspectors determined the finding could be evaluated using Appendix A, "The SDP for Findings At-Power," through the various exhibits of Appendix A. The finding was determined to have very-low safety significance (Green) because the inspectors were able to answer "No" to all questions under Appendix A exhibits.

The inspectors did not identify a cross-cutting aspect associated with this finding because the finding was not representative of the licensee's current performance. Specifically, the incorrect guidance in procedure MGA04 which allowed plant personnel

14 days to perform a 10 CFR 50.59 applicability review after the TCN had been approved/implemented, was added in 1998.

Enforcement: The TS 5.4.1.a, "Procedures," requires, in part, that written procedures recommended in Regulatory Guide 1.33, Revision 2, Appendix A, be established, implemented, and maintained.

Regulatory Guide 1.33, Section 1.d. of Appendix A specifies, in part, procedure adherence and temporary change method. Conduct Manual MGA04, "TCN," was the implementing procedure for controlling temporary change methods to plant technical procedures.

Contrary to the above, from February 9, 1998, until February 4, 2015, the licensee failed to establish adequate procedural controls for implementing TCNs to plant technical procedures. Specifically, plant procedures allowed for 10 CFR 50.59 applicability determinations/screenings to be performed up to 14 days after the TCN had been approved.

This violation is being treated as an NCV, consistent with Section 2.3.2 of the Enforcement Policy because it was of very-low safety significance, and was entered into the licensee's CAP as CARD 15-20935. As immediate actions, the licensee communicated the procedure deficiency to all site personnel, and planned to revise the conduct manual MGA04 to correct the deficiency. (NCV 05000341/2015008-02, "TCN Administrative Conduct Manual MGA04 Deficiency")

(3) (Open) Unresolved Item 05000341/2015008-03, Inadequate 10 CFR 50.59 Evaluation for the On-Line NobleChem™ Process

Introduction: The inspectors identified an Unresolved Item (URI) associated with 10 CFR 50.59 evaluation 10-0286. Specifically, during review of Engineering Design Package (EDP) 36240, and associated 50.59 evaluation 10-0286 Revision A, the inspectors identified a URI associated with the licensee's evaluation of the calculated hydrogen accumulation in balance of plant (BOP) piping sections and the consequences of a potential hydrogen detonation in the BOP piping sections on the accident frequency described in the final safety analysis report (as updated).

Description: In EDP 36240, Rev. A, "On-Line Noble Chemistry Injection Skid Implementation Related Plant Changes," the licensee approved modifications to the feed system, which provided the equipment needed for addition of the catalytic materials used in the OLNC process. On November 15, 2012, the licensee approved Safety Evaluation (SE) 10-0286 "Provide Evaluation of Noble Metal Solution Injected into Reactor Feed System, Revision A (EDP 36240)." In this SE, the licensee documented their basis for implementation of the OLNC process which introduced/deposited noble metal catalysts onto the wetted surfaces of the reactor, fuel, and associated piping systems. Because the OLNC deposited platinum material on the wetted surface of reactor plant components, the licensee considered the impact of this change on the reactor coolant system, and attached piping system functions. The licensee evaluated the catalytic effect of OLNC to potentially increase the failure probability for 6 piping areas in the BOP piping systems susceptible to hydrogen accumulation, and potential detonation events originally identified by the licensee in CARD 02-12570. In its evaluation, the licensee concluded that diffusion within the BOP pipe segments, and out into the Mitigating Systems piping would effectively offset potential hydrogen

accumulation such that detonable levels of hydrogen (approximately 15 percent) would never accumulate in BOP pipe segments. The licensee provided the inspectors with reference documents GE-NE-0000-0007-4008-01, Revision 0, "BWR Piping and Component Susceptibility to Hydrogen Detonation", and GE-NE-0000-0003-1981-01, Revision 0, "Report of the GENE Pipe Rupture Task Force," that provided the bases for the licensee's use of diffusion as a credible mechanism to mitigate hydrogen accumulation. However, the inspectors determined that the reference reports did not provide any provisions for the use of diffusion as a credible mechanism for reducing hydrogen buildup. Therefore, the inspectors questioned whether the licensee's technical basis for the application of the diffusion mechanism to evacuate hydrogen accumulation from the BOP segments as documented in the licensee's SE 10-0286 Revision A, adequately demonstrated that hydrogen accumulation will not exceed detonation limits. In addition, the inspectors questioned the effects that a potential hydrogen detonation in these BOP segments would have on the frequency of occurrence of accidents previously evaluated in the UFSAR.

The licensee entered this issue into their CAP as CARD 15-21102, "50.59 Evaluation Technical Basis Deficiency." This URI will remain open pending the inspectors' review of the additional information to determine: (1) whether reasonable technical basis exists to support crediting diffusion as a means to mitigate hydrogen accumulation in BOP piping sections; and (2) whether the consequences of a potential hydrogen detonation in BOP piping sections are bounded by existing UFSAR analyses. (URI 05000341/2015008-03, "Inadequate 10 CFR 50.59 Evaluation for the OLN Process")

## .2 Permanent Plant Modifications

### a. Inspection Scope

The inspectors reviewed 6 permanent plant modifications that had been installed in the plant during the last 3-years. This review included in-plant walkdowns for portions of the Division 1 Core Spray System; Emergency Diesel Generators, and Air Starting System. The modifications were selected based upon risk significance, safety significance, and complexity. The inspectors reviewed the modifications selected to determine if:

- the supporting design and licensing basis documentation was updated;
- the changes were in accordance with the specified design requirements;
- the procedures and training plans affected by the modification have been adequately updated;
- the test documentation as required by the applicable test programs has been updated; and
- post-modification testing adequately verified system operability and/or functionality.

The inspectors also used applicable industry standards to evaluate acceptability of the modifications. The list of modifications and other documents reviewed by the inspectors is included as an Attachment to this report.

This inspection constituted 9 permanent plant modification samples as defined in IP 71111.17-04.

b. Findings

(1) Failure to Test the Electrical Characteristics for Control Power Transformers to Verify the Degraded Voltage Calculations Results

Introduction: The inspectors identified a finding of very-low safety significance (Green), and an associated NCV of 10 CFR Part 50, Appendix B, Criterion III, "Design Control," for the licensee's failure to ensure that the electrical design characteristics for Structures, Systems, and Components (SSCs) installed in the plant were bounded by the design calculations. Specifically, the licensee failed to verify by testing that the turn ratio and the impedance for the control power transformers used to supply control power to several SSCs installed in the plant were less than, or equal to the value used in the degraded voltage calculations. Design calculation DC-6479 relied on Control Power Transformer (CPT) test data for similar model spares instead of the vendor published data. The licensee used the test data which was less conservative than the vendor published data to show that the available voltages at these devices were adequate, with very little margin, to operate these devices under worst case voltage conditions.

Description: Design Calculation DC-6479, Volume I, showed that several 150 Volt Ampere (VA) CPTs, which supplied 120 Vac control power to their associated safety-related devices, had insufficient voltage at the devices for pick-up. The 150VA CPTs were manufactured by Micron and were of model B150BTZ13JK. The technical data used as input in DC-6479 Volume I were taken directly from the vendor data sheet, which was used to calculate the minimum required voltage needed to pickup the devices. The input values used were: (1) turns ratio of 3.8; (2) source voltage of 480 Vac; (3) reactance of 8.00; (4) percent inductance of 0.600; and (5) percent impedance of 8.02. The calculation results showed 24 devices with insufficient pick-up voltage with negative margin between the required calculated voltage, and the available source voltage under worst case degraded voltage conditions.

The licensee contracted with Consumer Energy Laboratory Services to determine the actual test value for the impedance and turns ratio of the 150VA (B150BTZ13JK) CPT. The testing was performed using spare CPTs from the Fermi warehouse. An impedance value of 5.6, and turns ratio value of 3.78 were obtained from Consumer Energy Laboratory test results. The licensee recalculated the pick-up voltage available at the affected devices per Calculation DC-6479 using the test values and showed that the 150VA CPTs had sufficient pick-up voltage to pick up the devices at the degraded voltage analytical limit, with available margin.

Technical Evaluation, TE-R00-13-028, "Evaluation of Safety-Related 150 VA CPTs Minimum Pick-Up Voltage," was performed to evaluate the minimum source voltage needed to be applied to the safety-related 150 VA CPTs in order to have sufficient pick-up voltage at their associated devices. This evaluation documented the licensee's review of original data, and the re-calculation using the test data for the CPTs.

Corrective Action CARD 13-25184, "Maintenance Procedures Need to be Revised to Align with Electrical Design Calculations," was written to revise the affected maintenance procedures to insert a test section to include periodic testing of the CPTs to ensure alignment with the design calculations. The Document Change Requests to revise the affected maintenance procedures were cancelled because the licensee determined that the procedure changes were not required. The licensee's determination was based on benchmarking of industry and vendor standards.

The inspectors were concerned that lack of testing of the installed CPTs, and the failure to use the approved vendor data to verify that sufficient voltage would be available to pick-up the SSCs did not provide adequate support data for their electrical calculations. The licensee entered this issue into the CAP as CARD 15-21129, "Review CPTs Test Requirement," and stated that, based on the component type, there was a reasonable assurance that the field installed CPTs will align with and meet the same acceptance criteria as provided by Consumer Energy Laboratory Services, by similarity. Therefore, there was reasonable assurance that the CPTs installed in the field would be found capable of performing their design function when tested.

Analysis: The inspectors determined the licensee's failure to assure and verify by testing the electrical characteristics for CPTs used to supply control power for several SSCs were bounded by the design values used in the design electrical calculations was contrary to 10 CFR Part 50, Appendix B, Criterion III, "Design Control," and was a performance deficiency. Specifically, the licensee relied on CPT test data results of spares instead of the vendor published data or test data of the installed equipment to show that the available voltage at these devices was adequate to operate these devices under worst case voltage conditions.

The performance deficiency was determined to be more than minor in accordance with IMC 0612, "Issue Disposition Screening," because the finding was associated with the Mitigating Systems cornerstone attribute of design control, and affected the cornerstone objective of ensuring the capability and reliability of systems that respond to initiating events. Specifically, the failure to assure and verify by testing that the electrical characteristics for the CPTs installed in the plant were adequate to provide control voltage for their associated SSCs could have affected the capability and reliability of these SSCs to perform their safety function. Although, by the end of the inspection, the licensee was able to justify there was reasonable assurance that the field installed CPTs would be adequate to support their safety function, at the time of discovery there was reasonable doubt on the adequacy of the available voltage for these SSCs given the very-low calculated margin.

In accordance with IMC 0609, "SDP," IMC 0609.04 Attachment, "Initial Characterization of Findings," Table 2, the inspectors determined the finding affected the Mitigating Systems cornerstone. As a result, the inspectors determined the finding could be evaluated using Appendix A, "The SDP for Findings At-Power," Exhibit 2, for the Mitigating Systems cornerstone screening questions. The inspectors answered "Yes" to Question 1 because the finding did not result in the loss of operability or functionality of any affected SSCs. The finding screened as having very-low safety significance (Green).

The inspectors determined this finding had an associated cross-cutting aspect, Conservative Bias (IMC 0310, Item H.14), in the Human Performance cross-cutting area because of the licensee's failure to use decision making-practices that emphasize prudent choices over those that were simply allowable. Specifically, the licensee failed to verify by testing the electrical characteristics of CPTs installed in the plant and instead provided inadequate justifications to not perform the required testing. [H.14]

Enforcement: Title 10 CFR Part 50, Appendix B, Criterion III, "Design Control," requires, in part, that design control measures shall provide for verifying or checking the adequacy

of design, such as by the performance of design reviews, by the use of alternate or simplified calculation methods, or by the performance of a suitable testing program.

Contrary to the above, from June 27, 2014, until February 13, 2015, the licensee's design control measures failed to verify the adequacy of the design for the minimum available control voltage for several SSCs. Specifically, the licensee failed to perform a suitable testing program to verify that the electrical characteristics of CPTs used to supply power for several SSCs were adequate and bounded by the design values used in the electrical calculations. The licensee relied on test data of spare CPTs instead of using the approved vendor data, or verifying by testing the CPTs installed in the plant equipment.

Because this violation was of very-low safety significance and was entered into the licensee's CAP as CARD 15-21129, "Review CPTs Test Requirements," this violation is being treated as an NCV, consistent with Section 2.3.2 of the NRC Enforcement Policy. (NCV 05000341/2015008-04, "Failure to Test the Electrical Characteristics for CPTs to Verify the Degraded Voltage Calculations Results")

#### **4. OTHER ACTIVITIES**

##### **4OA2 Problem Identification and Resolution**

###### **.1 Routine Review of Condition Reports**

###### **a. Inspection Scope**

The inspectors reviewed several corrective action process documents that identified or were related to 10 CFR 50.59 evaluations and permanent plant modifications. The inspectors reviewed these documents to evaluate the effectiveness of corrective actions related to permanent plant modifications and evaluations of changes, tests, and experiments. In addition, corrective action documents written on issues identified during the inspection were reviewed to verify adequate problem identification, and incorporation of the problems into the corrective action system. The specific corrective action documents that were sampled and reviewed by the inspectors are listed in the Attachment to this report.

###### **b. Findings**

No findings were identified.

##### **4OA6 Management Meetings**

###### **.1 Exit Meeting Summary**

The inspectors presented the inspection results to Ms. K. Hullum-Lawson, Mr. W. Colonnello, and other members of the licensee staff on March 9, 2015, and on February 13, 2015, respectively. The licensee personnel acknowledged the inspection results presented, and did not identify any proprietary content.

ATTACHMENT: SUPPLEMENTAL INFORMATION

## **SUPPLEMENTAL INFORMATION**

### **KEY POINTS OF CONTACT**

#### Licensee

W. Colonnello, Director, Support  
K. Scott, Director, Work Management  
J. Ford, Director, Organization Effectiveness  
H. Yeldell, Manager, Maintenance  
S. Berry, Manager, Outage and Scheduling  
R. LaBurn, Manager, Radiation Protection  
K. Burke, Manager, Industry Interface  
L. Peterson, Director, Engineering  
C. Robinson, Manager, Licensing  
S. Bollinger, Manager, Performance Improvement  
M. Philippon, Plant Manager  
G. Strobel, Manager, Operations  
K. Hullum-Lawson, Manager, Plant Support Engineering  
J. Davis, Manager, Training  
H. Torberg, Manager, Security  
E. Kokosky, Manager, Quality Assurance  
S. Hassoun, Supervisor, Licensing Programs  
W. Mayer, Supervisor, Nuclear Engineering  
R. Sloan, Engineering  
J. Haas, Licensing, Engineer  
B. Waybright, Engineering  
D. Coseo, Supervisor, Nuclear Licensing  
G. Brede, Engineering

#### U.S. Nuclear Regulatory Commission

B. Kemker, Senior Resident Inspector  
P. Smagacz, Resident Inspector

## LIST OF ITEMS OPENED, CLOSED AND DISCUSSED

### Opened

05000341/2015008-01	NCV	Failure to Translate TS 3.7.4 Requirements Correctly into Plant Procedures (Section 1R17.1.b.(1))
05000341/2015008-02	NCV	Temporary Change Notice Administrative Conduct Manual MGA04 Deficiency (Section 1R17.1.b.(2))
05000341/2015008-03	URI	Inadequate 10 CFR 50.59 Evaluation for the On-Line NobleChem™ Process (Section 1R17.1.b.(3))
05000341/2015008-04	NCV	Failure to Test the Electrical Characteristics for Control Power Transformers to Verify the Degraded Voltage Calculations Results (Section 1R17.2.b(1))

### Closed

05000341/2015008-01	NCV	Failure to Translate TS 3.7.4 Requirements Correctly into Plant Procedures (Section 1R17.1.b.(1))
05000341/2015008-02	NCV	Temporary Change Notice Administrative Conduct Manual MGA04 Deficiency (Section 1R17.1.b.(2))
05000341/2015008-04	NCV	Failure to Test the Electrical Characteristics for Control Power Transformers to Verify the Degraded Voltage Calculations Results (Section 1R17.2.b(1))

### Discussed

None

## LIST OF DOCUMENTS REVIEWED

The following is a list of documents reviewed during the inspection. Inclusion on this list does not imply that the NRC inspectors reviewed the documents in their entirety, but rather, that selected sections or portions of the documents were evaluated as part of the overall inspection effort. Inclusion of a document on this list does not imply NRC acceptance of the document or any part of it, unless this is stated in the body of the inspection report.

### 10 CFR 50.59 EVALUATIONS

<u>Number</u>	<u>Description or Title</u>	<u>Date or Revision</u>
12-0126	TSR-36828 Reevaluation of Reflective Metal Insulation [RMI] Debris Head Loss in Design of RHR and CS Torus Suction Strainers	0
12-0172	Operation at Reduced Power with the South RFP and RFPT Out of Service	0
10-0286	Evaluation of Noble Metal Solution Injection into Feedwater System	A
12-0082	Implement of Transient Reactor Analysis Code (GE) FOR Anticipated Operational Occurrences as a New Methodology for Cycle 16	0
13-0308	Implementation of PRIME Fuel Thermal Mechanical Methodology as a New Methodology for Cycle 17	0
11-0315	Replacement of the existing analog T41K412 Control Center Heating, Ventilation, and Air Conditioning (CCHVAC) static pressure controller manufactured by Air Monitor with a new digital controller produced by Moore Industries	0
12-0227	Revision of UFSAR Section 7.2.1.1.3.8, Testability to add a new test method involving the use of the RPS Test Box inhibiting the half scram signal during performance of the RPS Scram Channel Functional Surveillance Testing.	0

### 10 CFR 50.59 SCREENINGS

<u>Number</u>	<u>Description or Title</u>	<u>Date or Revision</u>
13-0285	UFSAR Clarification to Section 8.3.1.1.8.6 per CARD 13-24170	A
12-0046	Condensate Storage and Transfer System	0
05-0526	Replace Cooling Coils in T4700-B003 and T4700 Drywell Coolers	A
13-0099	Core Spray Test Line Bypass Valve Stroke Time	0
13-0071	Install New High Point Vent On Division 1 Core Spray Piping	0
11-0261	Temp Mod to Provide Temporary Air Compressors and RHR Reservoir Make-Up During GSW	A
12-0016	RHR Complex Service Water Systems	0
12-0201	Emergency Diesel Generator System	0
07-0137	Fire Extinguisher Relocations in Turbine and Reactor Buildings	A

**10 CFR 50.59 SCREENINGS**

<u>Number</u>	<u>Description or Title</u>	<u>Date or Revision</u>
09-0227	Installation of Anodes in Emergency Diesel Generator (EDG) Heat Exchangers	A
10-0286	ON-LINE NOBLE CHEMISTRY (OLNC) Injection Skid Implementation and Evaluation of Noble Metal Solution	A
12-0013	Mitigating Condenser Tube Leaks by Adding Wood Product to The Circulating Water System	0
12-0058	Hydrogen Water Chemistry System	0
12-0073	Reactor Building Closed Cooling Water/Emergency Equipment Cooling Water System	0
12-0107	Secondary Containment Airlocks and Penetrations	0
12-0122	Reactor Building Closed Cooling Water/Emergency Equipment Cooling Water System	0
12-0137	Seal Weld Plate Between Valve Body to Bonnet Flange (N30F006)	0
14-0008	Weld Repair of Through Wall Leak on A 24" Elbow In Division 2 RHRSW (CARD 14-20240)	A
13-0167	Evaluation of safety Related 150VA CPTs Minimum Pick-up Voltage	0
13-0256	Inverter Replacement to Improve Safety Related Battery System Margins	C
13-0183	Loss of 120KV	0
13-0219	Loss of Buss 72F	0
14-0103	Division I 120V RPS Bus 1A Power Failure	0

**CORRECTIVE ACTION PROGRAM DOCUMENTS INITIATED DURING INSPECTION**

<u>Number</u>	<u>Description or Title</u>	<u>Date or Revision</u>
15-20785	50.59 Screening should have resulted in an Evaluation	January 29, 2015
15-20790	Operation Procedure Deficiencies	January 29, 2015
15-20803	50.59 Screen Deficiencies	January 30, 2015
15-20804	NRC Identified 2015 Mods & 50.59 Inspection Deficiency – Incomplete Description of UFSAR Design Function in 50.59 Screen 12-0046	January 30, 2015
15-20805	2015 Mods & 50.59 Inspection Deficiency – 12-0126 Screen Deficiency	January 30, 2015
15-20935	2015 Mods & 50.59 Inspection Deficiency – TCN Procedure (MGA04) Deficiency	February 4, 2015
15-20967	Inspection Procedure Typo	February 05, 2015
15-21102	50.59 Evaluation Technical Basis Deficiency	February 11, 2015
15-21129	Review CPTs Test Requirements	February 12, 2015

**CORRECTIVE ACTION PROGRAM DOCUMENTS REVIEWED**

<u>Number</u>	<u>Description or Title</u>	<u>Date or Revision</u>
10-24087	TCN T12100 Changed Plant Configuration Without The Necessary Engineering Documents	May 17, 2010

## **CORRECTIVE ACTION PROGRAM DOCUMENTS INITIATED DURING INSPECTION**

<b><u>Number</u></b>	<b><u>Description or Title</u></b>	<b><u>Date or Revision</u></b>
12-21684	TCN T12235 Does Not Meet Requirements of MGA04	March 2, 2012
11-23844	NRC-Comments and Question Regarding EFA-E11-002	April 15, 2011
12-21686	Evaluate Demin Header Draining	March 2, 2012
12-24693	2012 NRC Gas Accumulation Management Inspection Concern on As-Found Data for ECCS 31 Day Vent Surveillance	May 24, 2012
05-20428	Procedure Non-Compliance Results in High Torus Level	January 25, 2005

## **DRAWINGS**

<b><u>Number</u></b>	<b><u>Description or Title</u></b>	<b><u>Date or Revision</u></b>
6M721-5734	Emergency Diesel Generator System Functional Operating Sketch	BE
29.100.01 Sh. 2	Primary Containment Control	12
6M721-2083	Residual Heat Removal Division 2	BQ
6M721-2034	Diagram of Core Spray C.S.S. Reactor Building	AQ
6M721-3144-1	Pipe Isometric – North Core Spray Pump Discharge to RPV Penetration Reactor Building	X

## **MODIFICATIONS**

<b><u>Number</u></b>	<b><u>Description or Title</u></b>	<b><u>Date or Revision</u></b>
LCR 13-012-UFS	UFSAR Change to Figure 7.3-7	0
LCR-06-002-UFS	UFSAR Chang to Figure 9.2-4	A
LCR 05-085-UFS	UFSAR Change to Table 3.9-27	A
TCN-12-235	Temporary Change to Procedure 23.104	February 21, 2012
TSR-37151	Core Spray Test Line Bypass Valve Stroke Time	0
EDP-37099	Install New High Point Vent on Div. 1 Core Spray	0
EDP-33690	Replacement of Drywell Cooler T4700B003 and T4700B004	A
LCR-13-100-UFS	UFSAR Change to Section 8.3.1.1.8.6	0
EDP-36239	Hydrogen Water Chemistry (HWC) Flow Reduction to Meet OLNCR Requirements	A
EDP-36286	Replace EDG Heat Exchanger Plugs in Selected Locations With Plugs Containing Threaded in Zinc Alloy Anodes	0
EDP-36904	Support Buried Pipe Inspection and Installation of Guided Wave Permanently Installed Monitoring System	A
TSR 37203	Revise EQ documents DC-3237, EQ1-EF2-063, NE- 6.6-EQMS.040 and CECO as per CARD 13-22094	0
LCR 13-052-UFS	Revision of BOP battery duty cycle duration	0
LCR 13-100-UFS	A clarification to Section 8.3.1.1.8.6 regarding the EDG air start system components is tracked by CARD 13-24 170; continued on Page 2.	0
TSR 36882	Remove Agasta Relays from EQ harsh Program and Cancel File EQ1-EF2-048	0

## OPERABILITY EVALUATIONS

<u>Number</u>	<u>Description or Title</u>	<u>Date or Revision</u>
EFA-T41-12-002	Loss of Division 2 EESW TCV Temperature Control Function	0

## OTHER DOCUMENTS

<u>Number</u>	<u>Description or Title</u>	<u>Date or Revision</u>
TSR-27482	Seismic Classification of the Drywell Cooling System	0
WO 31429288	Perform UT Examination at Core Spray Piping at both Sides of Penetration Room	January 30, 2011
WR 002052131	Revised Cooler Mounting Detail	1
TE-N22-14-071	RF17 FAC Inspection and Replacement Scope Technical Basis	0
TCN-12247	Comp Measures to Allow CCHVAC to be Considered Operable While EECW TCV is Bypassed	March 25, 2012
POC 4700361385	Purchase Order Change for Purchase of Plug, Pipe, 3/4" IN, CRBN STL SA 105, SQ THREAD	October 31, 2010
WO 34499650	NEI09-014 Excavation/Backfill for Buried Pipe Inspections RHR SW	August 26, 2013
SI Report No. R1 1400057.401	Code Case N-661-1 Weld Repair for RHRSW	January 16, 2014
TE-N61-10-018	Technical Evaluation to Determine Suitability/Compatibility of Wood Flour on Plant Systems Repaired Permanently	A
GE-NE-0000-0007- 4008-01	BWROG Hydrogen Accumulation Committee - BWR Piping and Component Susceptibility to Hydrogen Detonation	0
TE-P79-12-018	Follow-up Analyses to CARD 02-12570, Susceptibility to Hydrogen Accumulation In BOP Steam Pipes	0
GE-NE-0000-0003- 1981-01	Report of the GENE Pipe Rupture Task Force	

## PROCEDURES

<u>Number</u>	<u>Description or Title</u>	<u>Date or Revision</u>
MGA04	Temporary Change Notices	6
MGA04	Temporary Change Notices	18
29.ESP.23	Defeat of RBCCW/EECW Cooling Water to Drywell Isolation	5
22.000.03	Power Operation 25% to 100% to 25%	95
23.203	Core Spray System Operation	58
23.127	Reactor Building Closed Cooling Water/Emergency Equipment Cooling Water System	124 and 134
23.208	RHR Complex Service Water Systems	105
23.413	Control Center HVAC	89

## LIST OF ACRONYMS USED

ADAMS	Agencywide Documents Access and Management System
BOP	Balance of Plant
CAP	Corrective Action Program
CCHVAC	Control Center Heating, Ventilation, Air Conditioning
CFR	<i>Code of Federal Regulations</i>
CPT	Control Power Transformer
DRS	Division of Reactor Safety
ECP	Engineering Change Package
EDP	Engineer Design Package
EECW	Emergency Equipment Cooling Water
IMC	Inspection Manual Chapter
IP	Inspection Procedure
NCV	Non-Cited Violation
NEI	Nuclear Energy Institute
NRC	U.S. Nuclear Regulatory Commission
OLNC	On-Line NobleChem TM
OPDRV	Operations with a Potential for Draining the Reactor Vessel
PARS	Public Available Records System
SDP	Significance Determination Process
SE	Safety Evaluation
SSC	Structure, System, and Component
TCN	Temporary Change notice
TCV	Temperature Control Value
TS	Technical Specification
UFSAR	Updated Final Safety Analysis Report
UHS	Ultimate Heat Sink
URI	Unresolved Item
VA	Volt Ampere

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Sincerely,

**/RA/**

Robert C. Daley, Chief  
Engineering Branch 3  
Division of Reactor Safety

Docket No. 50-341  
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